Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Photoconductivity of biased graphene MARCUS FREITAG, IBM TJ Watson Research Center — The origin of photosensitivity of graphene devices has been attributed to either thermoelectric, photovoltaic, or bolometric effects. Here we report on the intrinsic photoresponse of electrically biased, but otherwise homogeneous single-layer graphene. In this simple, yet unstudied experimental condition, the photocurrent shows polarity reversal, as it alternates between two of these effects while sweeping the electronic potential. Near the Dirac point, the photovoltaic effect dominates, and the photocurrent adds to the transport current. Away from the Dirac point, the bolometric effect dominates, and reduces the transport current. Magnitude and polarity of the photocurrent allow us to infer the hot carrier and phonon temperatures under light illumination. The electron temperature is found to be an order of magnitude higher than the phonon temperature, shedding light on energy loss pathways other than via intrinsic graphene phonons. (M. Freitag et al., Nature Photonics, accepted for publication (2012).)

Marcus Freitag
IBM TJ Watson Research Center

Date submitted: 13 Nov 2012 Electronic form version 1.4